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Analysis of financial performance parameters of five FMCG companies by MCDM techniques

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Abstract: Social economic development was highly devastated due the pandemic situation of COVID 19. The bigger organizations are facing financial crisis that leads to financial distress. Many companies are suffering from financial losses due to lack of proper decision making which leads to unachievable organizational goal. Financial performance evaluation is crucial for decision- making in corporate finance, investment analysis, and risk assessment. **Multi-Criteria Decision Making (MCDM)** techniques help evaluate financial performance by considering multiple conflicting criteria. According to the past records no studies had been done to measure the financial performance based on Profitability ratio, Liquidity & solvency ratio management efficiency ratios and profit & Loss account ratios. Therefore, this paper aims at using Multi criteria decision making techniques mainly focussing on TOPSIS model in portfolio investment for analysing financial performance of five market leaders like ITC Ltd. Dabur, Godrej Ltd, Hindustan lever ltd and Colgate Palmolive. The companies with good financial performance were chosen for the study. This paper is significant since it will help to evaluate the financial performance of the well-known market leaders and rank their performance with the proposed model.

Key words: Multi criteria decision making, Liquidity Ratio, Solvency Ratio.

Introduction:

The fast-moving consumers goods (FMCG) industry is mainly responsible for producing, distributing and marketing consumers goods. The fourth largest sector in Indian economy is FMCG. Most commonly sold FMCG items are toiletries, electrical goods, household products, packaged foods etc. It is being observed that in last 10 years the revenue in FMCG sector is growing at a rate of 21.4%. Overall revenue generated by FMCG sectors urban segment account for 55% and for rural segment it is 45% and is growing at a faster rate in compared to urban segment. Changing lifestyle, easier accessibility and growing awareness are the key driving forces for this sector. Government of India has approved 100% FDI in cash and carry section along with 51% in multi-brand retails. An overview of FMCG industry signals that India's demographic profile plays an important role in the growth of this sector. Competitiveness among Indian FMCG players is very high. Competitive pressure increases on Domestic players as more MNC's entering the country so the industry has become more fragmented. When discussing FMCG (Fast-Moving Consumer Goods), our initial focus naturally gravitates towards products integral to daily consumption. The burgeoning disposable income in rural India and the untapped potential of the

rural market serves as significant drivers propelling the Indian FMCG sector forward. The recent emphasis on sectors like agriculture, MSMEs, education, healthcare, infrastructure, and the introduction of tax rebates outlined in the Union Budget 2022-2029 are anticipated to have a direct and positive impact on the FMCG industry. These strategic initiatives aim to bolster the disposable income of the populace, particularly in rural regions, fostering favourable conditions for sectoral growth. Contributing significantly to India's GDP, the FMCG sector stands as the fourth-largest segment in the economy, providing employment opportunities for over 3 million individuals. Its core components span household care, personal care, and food and beverages. The remarkable expansion of the FMCG industry, notably in tier II and tier III cities across India, primarily stems from the enhanced living standards and increased disposable incomes within these communities.

Financial performance can be assessed by using MCDM models. MCDM technique is popular since it can be used simultaneously in both the optimistic and pessimistic decision criterion. Generally, MCDM technique involves ranking of various decision alternatives with respect to criterion in order to obtain the best alternatives. In this study, the decision criteria were made up of Investment valuation ratios, liquidity ratio, Debt coverage ratio, management efficiency ratios and profit & loss account ratios. such as Net profit margin., Return On Capital Employed, Return on Net Worth, the current ratio (CR), the quick ratio (QR), financial charges coverage ratio, Investment Turnover ratio, Total asset turnover ratio, selling distribution cost composition and Expenses as composition of Total sales. Shannon’s entropy generally reflects the amount of useful information within a set of data to determine criteria weights in MCDM models such as TOPSIS. This study focuses on the financial performance of five Fast Moving Consumer Goods companies of India for the period of 5 years.

Literature Review:

The use of Multi-Criteria Decision Making (MCDM) methods in analyzing financial performance parameters of FMCG companies has gained attention due to the industry's complexity and dynamic nature. MCDM provides a structured approach to evaluate financial performance, considering profitability, liquidity, solvency, and efficiency, aiding stakeholders in making informed decisions. The integration of MCDM techniques with financial ratios has been extensively studied.(Lam et al., 2023).The authors propose a novel approach to assessing manufacturing efficiency, with TOPSIS. This method addresses the complex MCDM problem and accommodates diverse factors with distinct weights. The approach was applied to evaluate potential manufacturing entities in Cyprus through a three-step process: critiquing relevant criteria, evaluating efficiency using fuzzy TOPSIS, and assessing the criteria weight impact on decisions. This innovative methodology advances manufacturing performance evaluation, aiding informed decision-making and enhancing efficiency assessment while accommodating uncertainty through fuzzy logic integration. This pioneering method contributes to the understanding of manufacturing processes in today's competitive industry.(Salehi, 2023).Financial performance analysis is a method used to assess a company's financial health by identifying its strengths and weaknesses. It is primarily based on financial statements like Profit and Loss Account and Balance Sheets. Ratio and trend analysis are useful techniques for analysing financial performance. It helps identify a company's current financial position and is used by various stakeholders, including shareholders, directors, creditors, investors, and researchers(Narayan Konwar, n.d.)Another study analyses the financial performance and price fluctuations of selected Fast-Moving Consumer Goods (FMCG) companies over the past five years using different financial ratios. The study aims to provide insight for investors in choosing companies for better portfolios, as the COVID-19 pandemic has shifted our perception of essentials, including hygiene goods, and businesses like apparel, to discretionary

categories. The study also relates the risk associated with the stocks of selected FMCG companies.(Anusree & Lorene, 2022). The TOPSIS method is a systematic and comprehensive approach for evaluating alternatives based on multiple criteria, considering both the positive and negative aspects of each option. This helps decision-makers select the most suitable option based on their preferences and objectives.(Anusree & Lorene, 2022)

Multi-criteria group evaluation model is used for measuring company performance, considering nonfinancial qualitative criteria like Corporate Social Responsibility, innovation, and service level. The model uses fuzzy sets theory to model uncertainties in these criteria. The approach allows for consensus among experts, and the best alternative is chosen using a Shannon weighted average operation. This model can be used for comparisons in the same field, region, or before and after managerial interventions.(Pavlačková et al., 2023)

TOPSIS

The use of mathematical techniques in the realm of Multi-Criteria Decision Making (MCDM) dates back to the 1700s. Early references to such methods can be found in the works of prominent figures like Benjamin Franklin, Marquis de Condorcet, Francis Edgeworth, and Vilfredo Pareto. Over the last century, progress in this field has been significantly shaped by the contributions of economists, mathematicians, and scientists from various disciplines, including Frank P. Ramsey, Leonard Savage, John von Neumann, Oscar Morgenstern, John Nash, Paul Samuelson, Ward Edwards, and Herbert A. Simon. Originally rooted in historical developments, MCDM techniques—commonly applied for optimization—have continually advanced, offering effective solutions to a wide range of social, financial, and economic challenges.

Among the well-established MCDM methods, the Technique for Order Preference by Similarity to Ideal Solution (TOPSIS) stands out. Devised by C.L. Hwang and K. Yoon in 1981, with further contributions from Yoon in 1987 and Hwang et al. in 1993, TOPSIS has garnered attention for its ability to minimize subjective input from decision-makers, relying primarily on weight assignments. This approach proves invaluable for tackling real-world multi-attribute and multi- criteria decision-making challenges, aiding in issue organization, analysis, comparison, and option ranking. TOPSIS operates as a balancing strategy, evaluating alternatives by determining weights, normalizing scores for each criterion, and computing the mathematical distance from each alternative to the ideal solution. The method accommodates conflicting dimensions of criteria in multi-criteria scenarios through normalization, facilitating trade-offs between criteria to achieve optimal outcomes. Central to TOPSIS is the selection of alternatives that are closest to the ideal solution while being farthest from the negative ideal solution. This methodology has gained widespread acceptance due to its logical framework, minimal subjective intervention, and efficiency in determining the best alternative based on relative criterion importance. The efficacy of the TOPSIS method is further underscored by its straightforward computational steps, robust quantitative foundation, and intuitive nature. By classifying alternatives based on their proximity to ideal and negative ideal solutions, TOPSIS aids decision-makers in assessing and selecting optimal solutions across various contexts. In this study, the TOPSIS procedure unfolds across six distinct steps, encompassing the creation of a decision matrix, normalization, construction of weighted normalized matrix, identification of ideal and negative ideal solution points, computation of distances to the maximum ideal point, and determination of relative proximity to the ideal solution.

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Objectives of the Study

1. To compare the Liquidity position of the five selected FMCG companies.
2. Assessing the financial performance by Multi Criteria Decision making model (MCDM)

TOPSIS Process is designed as follows:

Step-1 Create an evaluation matrix consisting of m alternatives and n criteria, with the $_{ij}$

Step-2 The matrix $(x)_{mxn}$ is then normalised to form the matrix R = $(r_{ij})_{m\ x\ n}$

$$r_{ij} = \frac{x_{ij}}{\sqrt{\sum_{k=1}^{m} x_{kj}^2}} \quad , i=1, 2\ldots\ldots, m, j=1,2, 3\ldots ,n$$

$t_{ij} = r_{ij} . w_j$, i= 1,2,….m , j= 1,2,3,…..n

Where $w_j = W_j / \sum_{k=1}^{n} W_k$,j = 1.2…..n so that $\sum^n w_i = 1$ and W_j is the original weight given to the indicator v_j , j = 1,2,…n

Step -4: Determine the worst alternative denoted by (A_w) and the best alternative by (Ab)

$A_w = \{\max (t_{ij} | i= 1,2,\ldots m)| j \in J_- , \min (t_{ij} | i= 1,2,\ldots m)| j \in J_+ \} \equiv \{ t_{wj} | j=1,2,\ldots n\}$ $A_b = \{\min (t_{ij} | i= 1,2,\ldots m)| j \in J_- , \max (t_{ij} | i= 1,2,\ldots m)| j \in J_+ \} \equiv \{ t_{bj} | j=1,2,\ldots n\}$

Where

$J_- = \{ j= 1, 2,\ldots n | j \}$ associated with the criteria having negative impact $J_+ = \{ j= 1, 2,\ldots n | j \}$

associated with the criteria having positive impact

Step -5: calculate L^2 – distance between the target alternative i to the worst condition A_w

$$d_{iw} = \sqrt{\sum_{j=1}^{n} (t_{ij} - t_{wj})^2} \qquad i= 1, 2\ldots m$$

and the distance between the alternative i and the best condition A_b

$$d_{ib} = \sqrt{\sum_{j=1}^{n} (t_{ij} - t_{bj})^2} \qquad i= 1, 2,\ldots m$$

where d_{iw} and d_{ib} are L^2 -norm distances from the target alternative i to the worst and best condition respectively.

Step -6: calculate the similarity to worst condition:

$S_{iw} = d_{iw} / (d_{iw} + d_{ib}) , 0 \leq s_{iw} \leq 1,$ i = 1,2,…,m

S_{iw} =1 if and only if the alternative solution is the best condition

S_{iw} =0 if and only if the alternative solution is the worst condition Step 7: Rank the alternatives according to s_{iw} (i=1,2, 3,,m)

Here in this study, the decision criteria were chosen of liquidity Ratios like Quick Ratio, Inventory Turnover Ratio, Dividend Payout Ratio, Dividend Payout Ratio, Earnings Retention Ratio, Cash Earnings Retention Ratio, and the ROE. (Shaverdi & Yaghoubi, 2021)noted that various uncertainties that happens in real life situations could be mitigated by using fuzzy logic to overcome the limitation that persists in traditional MCDM models.

Research Methodology:

Selection of Sample

To evaluate the financial performances of FMCG companies I have selected 5 leading FMCG companies in India like Godrej Consumer product Ltd, ITC Ltd, Dabur Ltd, Hindustan Lever Ltd and Colgate -Palmolive Ltd.

Sources of Data:

The study is done from secondary data. The data is gathered from money control .com and company website.

Period of Study: The study is conducted for the period March 2020- March 2024.

Research Framework Proposal Table -1

	Descriptions	
Decision Criterion	Investment Valuation Ratios	Net Profit Margin (NPM) Return on Capital (ROC) Return on Net Worth (RONW)
	Liquidity and Solvency Ratios	Current Ratio (CR) Quick Ratio (QR) Financial Change Coverage Ratios (FCC)
	Management Efficiency Ratios	Investment Turnover Ratio (ITR) Total Asset Turnover Ratio (TATR)
	Profit & Loss Account Ratio	Selling Distribution Cost Composition (SDC) Expenses as Composition of total Sales (ETC)

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Decision Alternatives	Godrej Ltd, ITC Ltd, Dabur Ltd, Colgate-Palmolive Ltd, Hindustan Lever Ltd

Table -1 displays the framework proposal of this research which includes objectives, decision criteria and decision alternatives. Ten sets of prominent financial ratios are fixed as decision criteria. According to(Acosta-González et al., n.d.),financial ratios are categorized into four types: liquidity, solvency, efficiency, and profitability. A liquidity ratio is important because it indicates the company's ability to meet the short-term obligations. It easily converts its current assets in cash. Solvency ratio determines the company's ability to meet the long-term financial obligations highlighting whether it can survive in the long run. In fact, investors and shareholders postulate on profitability ratios, which indicate the value creation of a company. (Messer, R. Common financial ratios. In Financial Modelling for Decision Making: Using MS-Excel in Accounting and Finance; Emerald Publishing Limited: Bingley, UK, 2020; p. 325.) This research involves all four categories of financial ratios, in which CR, QR and FCCR are mainly used to study liquidity and Solvency ratio, NPM, ROC, RONW for Profitability ratio, ITR, TATR for efficiency, and SDC and ETC are adopted to observe the profit & Loss Account ratio of a company.

Proposed TOPSIS Model

Upon collection of various financial ratio data of five companies from moneycontrol.com, Shannon's entropy method is applied to calculate information's about weight of decision criteria. However, as the entropy value increases, the entropy weight decreases, indicating less information and lower significance of the criteria in a research study, and vice versa. Furthermore, Shannon's entropy has garnered significant attention in TOPSIS studies. The entropy method serves as a standard approach for determining attribute weights based on the variability of data among alternatives (Chai et al., 2019). The concept entropy originated with Rudolp Clausius in 1865 as a response to the observation that a portion of functional energy produced by combustion processes is inevitably lost through dissipation, failing to be converted into useful work. In this method m indicators and n samples are set in the evaluation and measured value of ith indicator in jth value is recorded as x_{ij} . The Shannon Entropy Weight Method (EWM) is a technique used to determine the weight of the criterion in decision making assigning greater weights to the criterion with greater variability or importance. Entropy concept can be considered as a criterion for the degree of uncertainty represented by a discrete probability distribution The first step is standardization of the values. Let the standardized value of ith index in the jth sample is denoted by p_{ij} ~~and~~ calculation method is as follows:

xij

Step-1: $$p_{ij} = \frac{}{\sum_{j=1}^{n} xij}$$

In the Step -2 Computation of the entropy measure of the project outcome using the equation

$E_j = -k \sum^{m} p_{ij} \ln p$ in which K= 1/ln(m)
$ij \quad i=1$

Step-3: The objective weight based on the entropy concept is $W_j = \frac{1-E_j}{\sum^{n} (1-E_j)}$
$j=1$

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In original situation $p_{ij} \ln p_{ij} = 0$ is set when $p_{ij} = 0$ for convenience in calculation.

Table-2.

Key Financial Ratios	Net profit Margin	Return on capital	Return on Net Worth	Current Ratio	Quick ratio	Financial charges coverage ratio	Investment Turnover Ratio	Total Assets Turnover ratio	Selling Distribution Cost composition	Expense s as composi tion of Total Sales
GODREJ	19.74	20.19	16.12	1.34	0.6	654.15	0.81	0.89	8.96	3.81
ITC	28.39	36.56	28.05	1.61	0.89	631	0.99	1.02	1.74	16.31
DABUR	15.81	27.82	21.84	0.67	0.35	45.14	1.27	1.27	6.06	3.86
HINDUSTAN LEVER	16.84	26.36	19.83	0.72	0.54	141.31	1.18	11.82	8.21	2.66
COLGATE	20.03	83.06	60.84	1.63	1.32	325.74	3.04	3.04	12.13	4.37

Source: Money control.com

Table 3 below shows the benefit criterion and negative criteria .of the financial parameters.

Table -3

MAX	MAX	MAX	MAX	MAX	MAX	MAX	MAX	MIN	MIN
NPM	ROC	RONW	CR	QR	FCC	ITR	TATR	SDC	ETC

Table -4 depict the standardization of the values. Normalization enables more accurate and better decision making .The standardized value of ith index in the jth sample is denoted by p_{ij} -

Table -4

Normalization Matrix (p_{ij})

0.195814	0.104078	0.109899	0.224456	0.162162	0.363955	0.111111	0.049335	0.241509	0.122864
0.281619	0.188463	0.191233	0.269682	0.240541	0.351074	0.135802	0.056541	0.0469	0.525959
0.15683	0.143409	0.148896	0.112228	0.094595	0.025115	0.174211	0.070399	0.163342	0.124476
0.167047	0.135883	0.135192	0.120603	0.145946	0.078622	0.161866	0.655211	0.221294	0.085779
0.198691	0.428166	0.41478	0.273032	0.356757	0.181234	0.41701	0.168514	0.326954	0.140922

*Author's Calculations

Entropy quantifies the uncertainty or randomness in a system. In the context of the Shannon method for normalization, entropy helps to determine the relative importance of each criterion.

Table: 5

Computation of Entropy measure

-0.13867	-0.10227	-0.10539	-0.14564	-0.12812	-0.15976	-0.10603	-0.06447	-0.14903	-0.11188
-0.15499	-0.13659	-0.13739	-0.15349	-0.14885	-0.1596	-0.11775	-0.07054	-0.06232	-0.14677
-0.12618	-0.12095	-0.12315	-0.10661	-0.09688	-0.04019	-0.13221	-0.08113	-0.12853	-0.11264
-0.12982	-0.11779	-0.11749	-0.11079	-0.12198	-0.08683	-0.12801	-0.12031	-0.14495	-0.09149
-0.13945	-0.15773	-0.15852	-0.15393	-0.15969	-0.13443	-0.1584	-0.13032	-0.15874	-0.11993

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Sum									
-0.6891	-0.63534	-0.64195	0.67046	-0.65552	-0.58081	-0.64241	-0.46678	-0.64358	-0.58271
E_{ij}									
0.985881	0.908964	0.918419	0.95921	0.937837	0.830951	0.919076	0.667808	0.920753	0.833663
1-Eij									
0.014119	0.091036	0.081581	0.04079	0.062163	0.169049	0.080924	0.332192	0.079247	0.166337

*Authors Calculations

The degree of importance of each criterion is indicated by its weights, A higher weight indicates greater importance and more significant impact on decision making. Weights of various criterion are shown below. Shannon weight calculation technique is used in the study.

Table -6 (Weights Calculated)

0.012635	0.081469	0.073008	0.036503	0.05563	0.151283	0.072419	0.29728	0.070919	0.148855

***Authors Calculation**

Financial Performance Evaluation and Ranking of Companies with the Proposed TOPSIS Model from the financial year 2020-2024.

Table-7

Rank Analysis

	RANK				
Name of Companies	**Mar-24**	**Mar-23**	**Mar-22**	**Mar-21**	**Mar-20**
Godrej Ltd	**1**	**3**	**3**	**1**	**1**
ITC Ltd	**3**	**1**	**1**	**2**	**3**
Dabur Ltd	**2**	**2**	**2**	**3**	**2**
Hindustan lever Ltd	**5**	**5**	**5**	**5**	**5**
Colgate-Palmolive Ltd	**4**	**4**	**4**	**4**	**4**

*Calculated using TOPSIS Model by using R Programming.

*Authors calculations

Conclusion: In this paper, TOPSIS Model is used to analyse the financial performances of companies based on the financial parameter's profitability ratio, liquidity and solvency ratio, debt coverage ratio, management efficiency ratios along with profit& loss account ratios to determine the financial performances of the companies. The proposed TOPSIS model is divided in two phases. The first phase consists of determining weights by Shannon entropy method and the second phase consist of determining rank by TOPIS model. As per the result obtained it is observed that Godrej Ltd is the best company except 2022 and 2023 and Dabur Ltd held a consistent second position. The companies should embark on making decisions and should take initiatives to enhance themselves in top financial position. Further studies could be considered for future studies in other stock markets.

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